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NOTES OF EXPLORATION BY THE U. S. GEOLOGICAL SURVEY.

MOUNT MCKINLEY, ALASKA. —A reconnaissance party in Alaska, in charge of Mr. Alfred Brooks, left Seattle in May with an outfit of twenty pack horses, and landed at Tyonek, on Cook Inlet, June 1st, whence they crossed to the Tanana river and to Rampart on the Yukon, where work was closed in the late fall. The trip was so arranged as to skirt Mount McKinley and the Great Alaskan Range, with a view to determining the mineral resources of the region, and also of depicting the topography of this unknown area of central Alaska.

From Tyonek the party made its way north to the Skwentna and Keechatno rivers, both of which were crossed by swimming, and then took a westerly course to the Great Alaskan Range of mountains. This was crossed by an old Indian trail which led to a comparatively easy pass, and by far the best yet found; it took the party to an altitude of 4,000 feet, and is described by Mr. Brooks as the only feasible one for pack animals. Thence the party crossed one of the forks of the Kuskokwim river, which was followed for 100 miles before they emerged from the mountains. Their route took them along the northwestern base of the mountains, and they camped at one place within ten miles of the summit of Mount McKinley.

Throughout, a careful route map was made of the territory traversed and of all within sight, and, as a result, all of the western and northern side of the Great Mountain Range was mapped to its summit, as seen from adjacent foothills, with the aid of vertical angles and micrometric measurements. The method employed for measuring distances has proved the most satisfactory yet attempted by these Government expeditions into Alaska. Heretofore the stadia has been employed; also distance measurement by means of a split object glass, by an instrument known as the stenometer. On this trip, however, movable cross hairs in the eye-piece of a telescope were used, the amount of motion of which, or the angle subtended, was measured by a micrometer screw, and by this means it was possible to observe directly distances far in excess of anything possible with the stadia, and much more accurately for the distance. These measurements were made by placing two signal poles at a known distance apart. These were observed from various

points in the route travelled, as long as they remained in sight, and the distance between them was measured by the micrometer screw. The observation on this horizontal base of known length gave the resulting distance. The extreme measurement made in this manner was on a base nearly 700 feet long. The two signals left at each extremity of this were occasionally observed upon up to a distance of thirty miles, which is undoubtedly the greatest distance ever measured directly or by what is known as the range-finder method. Throughout the journey signals were placed on bases varying from 50 to 700 feet in length, according to the distance from which it was expected they might be seen.

In skirting the Great Alaskan Range the party made its nearest camp to Mount McKinley at a distance of only ten miles from the summit in a direct line; thence the surveys were conducted to an altitude of 4,000 feet, within about nine miles of the summit, and Mr. Brooks climbed to an altitude somewhat greater than this. A number of observations were made on the summit to ascertain its elevation, and the reduction of six of these, considered to be particularly good, indicates that it is somewhat lower than the height previously reported three years ago by the first reconnaissance party of the Geological Survey which observed it. The final computations have not yet been made, but they show that the altitude is very close to 20,000 feet—perhaps the highest mountain peak in North America.

The camp at the base of McKinley was on the edge of the snow-line, and from this point the mountain rose in a horizontal distance of but ten miles to a height of 16,000 feet above the camp. This is probably the most abrupt mountain slope for its height in North America. The summit was found to be double-topped, the northern peak being about 1,000 feet lower than the southern or highest peak, and one and three-fourths miles distant.

Another result of this reconnaissance was to distinguish Mount McKinley from the second highest peak of the range—Mount Foraker, which lies about $14\frac{1}{2}$ miles to the south of it, and reaches an altitude of about 17,000 feet. The pass between the two summits is at about an elevation of 10,000 feet, being the highest prominent mountain pass on the continent.

The entire slope of this great mountain mass, for a distance of over fifty miles on the north and west sides, and at all points above the snow-line at 4,000 feet, is under a mass of snow, which has been consolidated into a permanent névé or glacier, so that the whole mountain range may be said to be ice-capped almost as is

the interior of Greenland. From the snow-line big glacial streams fill the larger valleys. In fifty miles six great glaciers were observed and mapped, and these terminate in streams of water in which the more prominent rivers of the western slope rise.

The territory traversed by this party was of very great extent. The pack train which reached Rampart completed a journey of nearly 800 miles, the longest taken with a pack train in Alaska. In the neighbourhood of the Great Range, especially near Mounts McKinley and Foraker, the country passed through is reported by Messrs. Brooks and Reaborn, both of whom are experienced campaigners in the western United States, as undoubtedly the greatest game country on the continent. The party were never without fresh meat, and they report that on the north slopes of the mountains moose, cariboo, and mountain sheep, or big horns, were unusually plentiful. The cariboo grazed with the pack animals at night, and as many as 100 sheep were counted in a single flock. Ptarmigan, the finest game bird, were so abundant and so tame that all that were needed for food were easily despatched with sticks or shot with pistols. Bear, also, were seen in large numbers, especially grizzly, cinnamon, and black bear. In fact, the country never having been visited by white men, nor in all probability ever hunted by Indians, all varieties of game, in addition to their abundance, were so tame that they could be approached within a few feet.

MR. R. D. CUMMIN, topographer of the U. S. Geological Survey, reports that Blue Mountain in Union Township in the north corner of Bedford County, Pennsylvania, is found to have an elevation of 3,136 feet above mean sea-level. This mountain is about one mile south of the Bedford-Blair County line. Its elevation was determined by careful spirit levels. It is connected with a line of primary levels along the road that skirts the west side of the mountain, and this is based directly on precise levels of the Pennsylvania Railroad; and there seems little doubt as to the accuracy of this height.

THE NORTHWEST CORNER of the Colville Indian Reservation, Washington, in the neighbourhood of Oroville, was surveyed and mapped in detail during the past summer. This region lies immediately east of the Cascade Mountains, along the Okanogan river, and adjacent to the Canadian boundary line. The country is practically an elevated table land, at altitudes of from 3,000 to

7,000 feet. The plateau breaks off sharply, and the streams flow with steep descent into the Okanogan from an escarpment edge having a general altitude of about 2,000 feet to the river valley, which has an elevation of about 900 feet.

The country is interesting because of the number of small lakes, mostly deriving their water supply from the winter snows. They vary in size from ponds of a few acres to lakes covering a square mile; while on the Okanogan, at the Canadian line, is Osogoos Lake, a considerable enlargement of the river, and though nearly nine miles in length, exceedingly shallow, so that a wagon road crosses it on a slight embankment. The upland lakes are, some of them, fresh and others alkaline, and the latter are noteworthy because of the beautiful translucent blue of their water, which is almost an iridescent peacock blue in colour.

A PARTY of the U. S. Geological Survey under Mr. George T. Hawkins spent the summer in extending primary triangulation along the north and south boundary line between the States of Washington and Idaho. A belt of geodetic triangulation covering an area of 5,000 square miles was completed over practically the whole of the celebrated Pelouse river wheat country, one of the most fertile areas in the United States. The country is open and rolling, with few very high hills, and no considerable mountains. It is well inhabited, and traversed by several railways.